Application Serial No. 10/536,593   PATENT
Reply to office action of August 27, 2007   Docket: CU-4233

REMARKS/ARGUMENTS

Reconsideration is respectfully requested.

Claims 1-38 are pending before this amendment. By the present amendment, claims 1, 3, 9, 20, 28, and 35 are amended, and claim 2 is cancelled. No new matter has been added.

In the office action (page 2), claims 9, 20, and 28 stand objected to as containing informalities.

Appropriate corrections have been made, and withdrawal of the objections is respectfully requested.

In the office action (page 3), claims 1 and 35 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,930,366 (Jamal) in view of U.S. Patent No. 4,796,279 (Betts) and U.S. Patent No. 6,567,482 (Popovic'). The "et al." suffix is omitted in a reference name.

The present invention relates to a method for generating a structure with preambles and a pilot that is appropriate for downlinks of an OFDMA based cellular system. The preambles and the pilot serve the purpose of searching cells and performing synchronization at a terminal that uses the preamble/pilot structure. The present invention provides a structure that requires less calculation in an OFDMA-based cellular system.

In the office action (page 5) the examiner indicated the allowability of claim 2 if rewritten in independent form including all the limitations of the base claim (claim 1). As such, the applicants have amended claim 1 to include all of the limitations of claim 2.

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As the examiner stated, "the Jamal et al. reference does not specifically [teach] a

predetermined time period and the prior art does not provide motivation." As such, the

applicants respectfully submit that claim 1 as amended is now in condition for allowance.

However, the applicants would also like to note, that in the present Invention of

claim 1, first and second preamble's are generated and included in a first slot in the

frame of a downlink signal, and a pilot pattern is generated and included in a plurality of

second slots.

The prior art references do not teach or suggest -- the first preamble having a

first symbol and a second symbol so that with a phase difference between the first and

second symbols--, where the first preamble is generated for the purpose of time and

frequency synchronization. The examiner states "[f]or the same issue of

synchronization, Betts et al. teach a preamble composed of two symbols that are 180°

out of phase with each other." However, the applicants respectfully submit that Betts is

not used for time and frequency synchronization.

Betts pertains to modems, and includes a subrate preamble decoder for

decoding information prior to channel equalization acquisition. The preamble spoke of

in Betts is not used for time and frequency synchronization. The preamble of Betts

instead consists of a plurality of phase reversed bauds comprising a sequence selected

to convey particularly useful information from a remote modem (Betts col. 1, lines 41-

45). In Betts, the symbols A and B, which are out of phase 180°, are resolved to real

and imaginary components. These components are fed through an adder, and the

output of the adder may be a "0" if the sum is positive and a "1" if the sum is negative

(see Betts col. 2 lines 27-30 and col. 2, lines 45-47). The "ones" and "zeros" are fed to

4-bit registers, and the 4-bit registers are latched into an 8-bit parallel in, parallel out,

register (Betts col. 2, line 60 to col. 3, line 4). This 8-bit parallel in, parallel out, contains

the decoded data being sent from a remote modem. In other words, these 180° out of

phase symbols are being used as "ones" and "zeros" conveying information. The

information starts out as the symbols A and B, and is later decoded and transformed

into data. In contradistinction, these out of phase symbols are not being used --_for the

purpose of time and frequency synchronization--, as claimed in the present invention.

In Betts, the preamble does comprise a sync. However, this sync is being used

for a purpose completely different than the presently claimed invention, which is --for the

purpose of time and frequency synchronization--. The sync detector 72 of Betts

generates a sync signal. This sync signal causes the outputs of each of the other 4-bit

registers (described above) to be latched into the 8-bit parallel in, parallel out, register

(Betts col. 2 line 67 to col. 3 line 4). The sync detector analyzes the contents of the shift

register 70 of Betts, and is an additional device used to decode the data sent from the

remote modem. As stated above, the preamble of Betts is not used for time and

frequency synchronization, it is only used to send "useful information." In fact, the

preamble precedes the synchronization sequence used to set up the required

parameters in a remote modem (which in itself is quite different from the

synchronization done in the presently claimed invention). (Betts col. 1, line 20-23)

Neither Jamal nor Popovic mention a first preamble generator generating a first

preamble --having a first and second symbol with a phase difference between the first

and second symbols.

Additionally, the present invention in claim 1 claims --a first slot which has the

first and second preambles—. The examiner states that Jamal must have some means

to arrange its synchronization code and pilot symbols in a frame as indicated in FIG. 4,

otherwise it would not be able to perform those functions. However, the applicants

respectfully submit that the synchronization code and pilot symbols may be generated

such that they are arranged differently in the frame. Jamal does not teach or suggest a

first slot with the first and second preambles, and a plurality of second slots having the

pilot symbols. In Jamal, the pilot code and the synchronization code are both generated

in each slot, as shown in FIGS. 3-5 (see col. 6, lines 12-15). In Jamal FIGS. 3-5, S_M

designates the slots of the frame. As can be seen from the figures of Jamal, each slot

includes both the synchronization code and the pilot symbols. Betts does not relate to a

cellular communications system and does not include the claimed slots, and Popovich

does not teach or suggest this claim limitation.

Additionally, in the office action page 2, the examiner states that, in FIG. 4 of

Jamal, it is clear that there are a plurality of pilot symbols on the time axis, and that its

inherent that they're on the frequency axis as well. The applicants respectfully assert

that the examiner misinterprets the applicants' claimed —pilot symbols to be provided on

the time axis and the frequency axis—. For example, in the presently claimed invention,

the pilot symbols provided on the time axis and the frequency axis are inserted for each

group of N_f subcarriers on the frequency axis, and for each group of N_t symbols on the

time axis (see specification FIG. 9 and page 30, line 22 to page 31, line 5). Claim 1 also

claims the pilot symbol being included in the second slot. As stated previously, each S_M

in Jamal FIGS. 3-5 is a slot. It is clear from these figures that there are not pilot

symbols provided on the time axis and the frequency axis in any of the slots of Jamal.

The examiner states "Popovic discloses a preamble being used for the purposes of downlink cell search." However, Popovic teaches using preambles for the uplink random access synchronization: "In the uplink direction, the known signal may be referred to as a preamble sequence" (Popovich col. 3, lines 47-51). It appears as though in Popovich at col. 3, lines 66-67, the preamble is directed to the uplink random access synchronization, while the synchronization code is directed to the downlink cell search.

Regardless, the applicants have added all the limitations of claim 2 (which the examiner indicated as allowable) into claim 1; and as such, the applicants respectfully submit that Jamal, Betts, and Popovic, whether considered individually or as a combined whole, do not teach or suggest claim 1.

As to claim 35, the applicants respectfully submit that claim 35 is allowable for much of the same reasons elaborated above. The limitations of claim 2 have been added into claim 35, and the applicants respectfully resubmit the above arguments. More specifically, as the examiner stated in the office action (page 5), Jamal et al. does not specifically teach a predetermined time period and the prior art does not provide motivation. Also, Betts does not relate to the issue of synchronization, and instead relates to decoding a preamble received from a remote modem, which contains important preliminary information. And none of Jamal, Betts, or Popovic teach the first and second preambles generated as a first slot and the pilot symbols generated as a second slot.

Accordingly, the applicants respectfully submit that Jamal, Betts, and Popovic,

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whether considered individually or as a whole, do not teach or suggest claim 35.

For the reasons set forth above, the applicants respectfully submit that claims 1-
38, pending in this application, are in condition for allowance over the cited references.
Accordingly, the applicants respectfully request reconsideration and withdrawal of the
outstanding rejections and earnestly solicit an indication of allowable subject matter.

This amendment is considered to be responsive to all points raised in the office
action. Should the examiner have any remaining questions or concerns, the examiner
is encouraged to contact the undersigned attorney by telephone to expeditiously resolve
such concerns.

Respectfully submitted,

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